# An Interactive Narrative Platform for Story Understanding Experiments (Demonstration)

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## ABSTRACT

Interactive Narratives are systems that use automated narrative generation techniques to create multiple story variants which can be shown to an audience, as *virtual* narratives, using cinematic staging techniques. The focus of previous research has included aspects such as the quality of automatically generated narratives and the way in which audiences respond to them. However in this work we have developed a mechanism for control of interactive narratives that supports their use in experiments to assess story understanding. This is implemented in our demonstration system, which features two parts: an interface that allows high-level specification of criteria for story understanding experiments; and a participant interface in which virtual narratives, conforming to the experimental design, are presented as 3D visualizations. The virtual narrative is based on a pre-existing children's story, and features a cast of virtual characters.

## Keywords

Virtual Agents; Interactive Storytelling; Narrative Modeling; Planning; Game-based Education.

## 1. INTRODUCTION

Interactive Narrative (IN) systems can be used to tell "virtual stories", through the activities of virtual characters when visualized on a 3D stage, using cinematic staging techniques. Thus these systems offer the potential to expand the study of story understanding in a way that is independent of linguistic abilities. Hence, in the work we present here (and in our accompanying technical paper [2]), we were motivated to explore the use of IN's to support story understanding experiments with children.

To this end we have developed a narrative generation mechanism that: allows control over the high-level specification of narrative variants during the design of story understanding experiments; subsequently uses that specification during narrative generation; and manages support of in-story cues when story variants are visualized within a 3D virtual world using cinematic staging techniques. For further detail on this mechanism see [2].

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Figure 1: Example Scene from the visualisation of the story "The day Tuk became a hunter". Here Tuk is shown in the Arctic with his father, making preparations to go seal hunting together.

In the demonstration users will be given the opportunity to explore both aspects of this mechanism. They will be able to "play the experimenter" by configuring the experimental set up via an intuitive mouse and menu driven interface (as shown in Figure 2). For example, they can select and re-order story and set up questionnaires related to the content of the virtual story that is presented. They will also have the opportunity to "play the participant": a narrative will be generated that corresponds to their configuration and they can watch as it is visualized.

A video showing the execution of the system and explaining the functionality of the different components can be found at: https://www.dropbox.com/s/dqn7h7wmja9k28b/Demo.mp4?dl=0.

## 2. SYSTEM OVERVIEW

Our demonstration system features a 3D storyworld based on a children's story called "The day Tuk became a hunter" [1]: a story about an Inuit boy who lives in the Arctic and dreams of becoming a great hunter. It features a cast of characters including Tuk, his parents, sister and a range of animals (Polar Bear, Seal, Walrus, Sled Dogs and so on). User involvement in the demo is via:

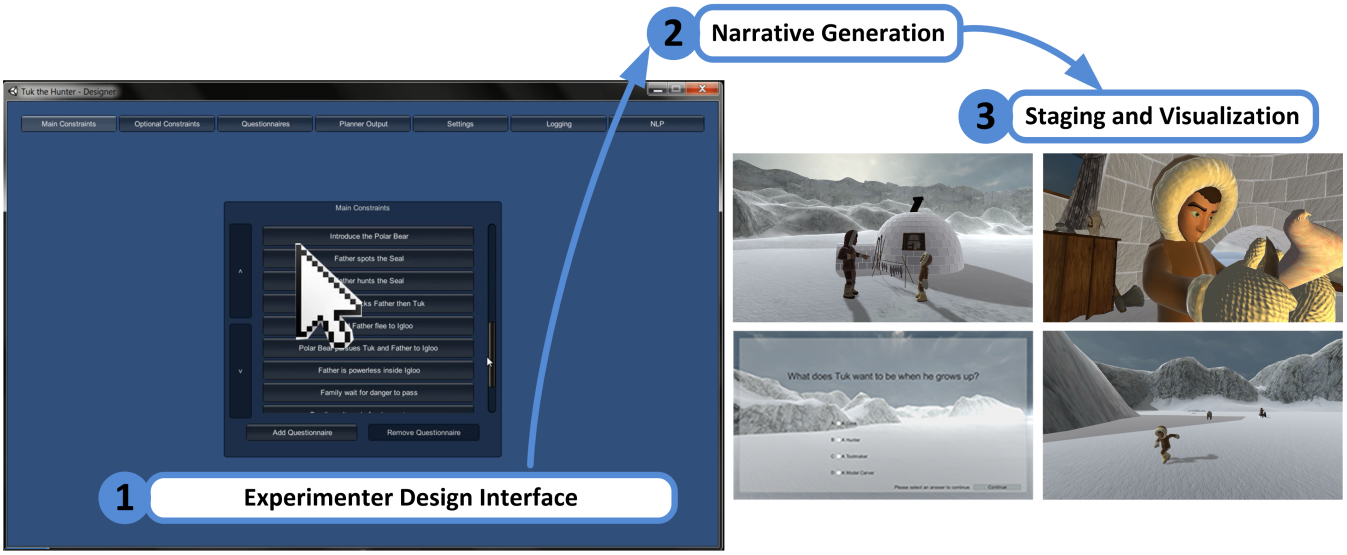


Figure 2: User Interaction in the Story Understanding Demonstration System. (1) At the Experimental Design Interface the user can select and order story cues and design story understanding questionnaires. (2) Users can then choose to generate a version of the Story of Tuk that satisfies the constraints they have selected. (3) Users can view system generated narratives which are presented to participants as 3D visualization using the Unity3D game engine. Elicitation and collection of online questionnaires is integrated with the visualization.

- Users can interact with the experimenter design interface to give a high level specification of the properties of the visual story to be generated, as shown in part (1) of Figure 2. They can use mouse and menu to select and re-order story content and cues and can also use the interface to configure online questionnaires.
- Users can also watch the "visual story" – one that is generated on-the-fly based on the experimental specification that they have entered. This story is visualized on a 3D stage using the Unity3D game engine as shown in part (3) of Figure 2.

## 2.1 Technical System Features

The technical solutions implemented in our demonstration IN are organized into the following components:

- The experimenter GUI is mouse and menu driven, allowing users to select and re-order content (high-level specification of the properties of virtual stories). The system translates this into control criteria which are passed to the narrative generator. The interface also allows users to configure online questionnaires.
- The virtual story is generated using a plan-based narrative generator which translates the high-level specification of narrative properties (entered by the experimenter at the GUI) into constraints which are used to shape narrative generation. For the story of Tuk, the domain model consists of a total of 100 generic narrative actions which yield in excess of 300 instantiated actions at run time, with generated narrative plans typically containing 65 to 75 narrative actions, depending on the specific cues selected.
- The generated story variant is visualized by a component that receives narrative actions from the generator and stages them in a 3D environment using the Unity3D game engine [3]. This visualization follows the text version of the story variant as closely as possible and where no reasonable visualization of the text is possible a narration is used. For example, the opening sentence of our featured story is: "This is a story about a boy named Tuk, who lived in the Arctic"and the visualization shows Tuk in the arctic (see Figure1), with accompanying narration.

# 3. USER INTERACTION CYCLE

User interaction with our demonstration system is as shown in Figure 2: via the Experiment Design Interface, users can configure different story elements and set up an online questionnaire; and via the Participant Interface they can watch the visualization of the virtual story (a narrative generated on-the-fly using their input) and respond to story understanding questions.

## 3.1 Experimental Designer Interaction

The experimental designer interface is shown in part (1) of Figure 2. Here an experimental user is shown selecting a particular constraint for the story and re-ordering its position with respect to other constraints. It is this final high-level configuration that will be used to generate a narrative to be used in a subsequent story understanding experiment. The narrative generator ensures that the output narrative both conforms to this specification as well as maintaining any required structure from the original story of Tuk. The system will also take care of low-level dependencies to ensure story consistency during staging (e.g. appropriate transition scenes for time of day). For further detail see the accompanying technical paper [2].

## 3.2 Experimental Participant

The visualization of the generated story and accompanying questionnaire are shown to the audience of the demonstration (as shown in part (2) of Figure 2).

During the generation of the story dedicated questionnaire actions will have been integrated into the narrative plan and these will be included into the visualization as required.

# 4. ACKNOWLEDGEMENTS

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## REFERENCES


[1] R. Melzack. *The Day Tuk Became a Hunter*. Macmillian, 1968.

[2] J. Porteous, F. Charles, C. Smith, M. Cavazza, J. Mouw, and P. van den Broek. Using Virtual Narratives to Explore Children's Story Understanding. In *Proc. of 16th Int. Conf. on Autonomous Agents and MultiAgent Systems (AAMAS)*, 2017 (to appear).

[3] Unity3D. https://unity3d.com/, 2017.

## 5. DEMONSTRATION REQUIREMENTS

- We will bring a laptop on which to run the demonstration.
- We will require a large external TV screen (with HDMI connection) or computer monitor.
- We will require a wide table.